

CLAIMS

1. A DC motor current monitoring arrangement, comprising:

5 current sensing means operable to create a waveform signal representing the waveform of the motor current;

filter means for the waveform signal and providing a high pass filter function and a low pass filter function, the high pass function having a frequency threshold above the frequency of mains interference and below the frequency of pulses in the waveform signal and indicative of movement created by the motor, and the low pass function having a frequency threshold above the frequency of the said pulses,

whereby the pulses are passed by the filter means to be available for counting.

2. An arrangement according to claim 1, wherein the pulses are commutator pulses.

3. An arrangement according to claim 1 or 2, wherein the pulses are injected into the motor current, during use, in dependence on the said movement.

4. An arrangement according to any preceding claim, wherein the filter means comprise separate high pass and low pass filter means.

5. An arrangement according to claim 4, wherein the low pass filter means follows the high pass filter means.

6. An arrangement according to any preceding claim, further comprising amplifier means.

7. An arrangement according to claim 6, wherein the amplifier means is operable to amplify the waveform signal prior to filtering by the filter means.

5 8. An arrangement according to any preceding claim, wherein the frequency threshold of the low pass filter function is above the highest frequency of pulses to be created by the motor.

9. An arrangement according to any preceding claim, further comprising  
10 counter means operable to count pulses passed by the filter means.

10. An arrangement according to claim 9, wherein the counter means is provided by a processor device.

15 11. A DC motor current monitoring arrangement, substantially as described above, with reference to the accompanying drawings.

12. A method of monitoring DC motor current, in which a waveform signal representing the waveform of the motor current is created and is filtered by a  
20 high pass filter function and a low pass filter function, the high pass function having a frequency threshold above the frequency of mains interference and below the frequency of pulses in the waveform signal and indicative of movement caused by the motor, and the low pass function having a frequency threshold above the frequency of the said pulses, whereby the pulses are  
25 passed by the filter means to be available for counting.

13. A method according to claim 12, wherein the pulses are commutator pulses.

30 14. A method according to claim 12 or 13, wherein the pulses are injected into the motor current in dependence on the said movement.

15. A method according to any of claims 12 to 14, wherein the high pass and low pass filter functions are applied separately.

5 16. A method according to claim 15, wherein the low pass filter function follows the high pass filter function.

17. A method according to any of claims 12 to 16, wherein amplification is applied to the waveform signal.

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18. A method according to claim 17, wherein amplification is applied prior to filtering.

15 19. A method according to any of claims 12 to 18, wherein the frequency threshold of the low pass function is above the highest frequency of pulses in the DC motor current.

20. A method according to any of claims 12 to 19, wherein pulses passed by the filter functions are counted, such as by means of a processor device.

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21. A method of monitoring DC motor current, substantially as described above, with reference to the accompanying drawings.

22. A monitoring arrangement for use with a DC motor, the arrangement comprising:

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detecting means for detecting movement of an item driven by the motor, to produce a pulse train; and

switch means operable to change state to cause current to be drawn from or to cease to be drawn from the motor supply, the state of the switch means being controlled by the pulse train in order to inject a pulse train into the motor supply.

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23. An arrangement according to claim 22, wherein the detecting means comprises a sensor responsive to one or more features of the item to detect movement thereof.

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24. An arrangement according to claim 22 or 23, wherein the detecting means comprise a Hall Effect sensor responsive to the movement of one or more magnets carried by the item.

10 25. An arrangement according to claim 23 or 24, wherein the item is rotatable, to cause the or each feature to repeatedly pass the sensor.

26. An arrangement according to claim 23, 24 or 25 wherein the detecting means further comprise an oscillator operable to provide an oscillating output  
15 only when enabled by the sensor.

27. An arrangement according to claim 26, wherein the sensor enables the oscillator when passing of the feature is detected.

20 28. An arrangement according to any of claims 22 to 27, further comprising a second monitoring arrangement remote from the first monitoring arrangement and operable to detect a pulse train carried on the motor supply, whereby communication between the monitoring arrangements may be solely by means of the motor supply.

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29. An arrangement according to claim 28, wherein the second monitoring arrangement is a monitoring arrangement in accordance with any of claims 1 to 11.

30 30. A monitoring arrangement for use with a DC motor, substantially as described above, with reference to the accompanying drawings.

31. An aperture closure member control arrangement, comprising:  
pulse means operable to create a train of pulses as the closure member moves;

5 counter means operable to count pulses of the train;

control means operable to determine the position of the closure member from the pulse count and to provide an output for modifying the manner in which the closure member is driven, in accordance with the predetermined position;

10 wherein the control means determines at least one speed change position and a reversing position and causes, in use, the speed of the closure member to change as the closure member passes the speed change position in at least one direction, and causes, in use, the response to an obstruction to change as the closure member passes the reversing position in at least one  
15 direction.

32. An arrangement according to claim 31, wherein the pulse train is created, in use, by a sensor responsive to one or more features of an item driven by a drive means which drives the closure member.

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33. An arrangement according to claim 31 or 32, wherein the pulse train is created, in use, by commutation of a DC motor used to drive the closure member.

25 34. An arrangement according to any of claims 31 to 33, wherein the counter means, in use, counts pulses created by different means at different positions of the closure member.

30 35. An arrangement according to claim 34, wherein the choice of pulses to be counted is changed as the closure member passes the speed change position.

36. An arrangement according to any of claims 31 to 35, wherein the pulses are provided to the counter means by an arrangement in accordance with any of claims 1 to 11 or 22 to 30.

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37. An arrangement according to any of claims 31 to 36, wherein a speed change position is located near a fully open or fully closed position of the closure member, and the closure member is caused, in use, to slow down as the closure member passes the speed change position in the direction of the fully open or fully closed position.

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38. An arrangement according to claim 37, wherein speed change positions are located near a fully open and near a fully closed position.

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39. An arrangement according to any of claims 31 to 38, wherein the reversing position is located near the fully closed position of the closure member, and the closure member is caused, in use, to re-open when obstructed while closing, unless the closure member is between the reversing position and the fully closed position.

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40. An arrangement according to claim 39, wherein the closure member is caused, in use, to stop when obstructed while closing, if the closure member is between the reversing position and the fully closed position.

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41. An arrangement according to claim 39 or 40, wherein the reversing position is between the fully closed position and the or the corresponding speed change position.

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42. An aperture closure member control arrangement, substantially as described above, with reference to the accompanying drawings.

43. A method of controlling an aperture closure member, in which a train of pulses is created as the closure member moves, pulses of the train are counted and the pulse count is used to determine the position of the closure member and to modify the manner in which the closure member is driven, in accordance with the determined position, wherein at least one speed change position and a reversing position are defined, and the speed of the closure member changes as the closure member passes the speed change position in at least one direction, and the response to an obstruction changes as the closure member passes the reversing position in at least one direction.

44. A method according to claim 43, wherein the pulse train is created, in use, by a sensor responsive to one or more features of an item driven by a drive means which drives the closure member.

45. A method according to claim 43 or 44, wherein the pulse train is created by commutation of a DC motor used to drive the closure member.

46. A method according to any of claims 43 to 45, wherein the pulse count is derived from pulses created by different means at different positions of the closure member.

47. A method according to any of claims 43 to 46, wherein the choice of pulses to be counted is changed as the closure member passes the speed change position.

48. A method according to any of claims 43 to 47, wherein the train of pulses is created in accordance with any of claims 12 to 21.

49. A method according to any of claims 43 to 48, wherein the closure member is slowed down as the closure member passes the speed change position in the direction of the fully open or fully closed position.

50. A method according to claim 49, wherein speed change positions are located near a fully open and near a fully closed position.

5 51. A method according to any of claims 43 to 50, wherein the closure member is caused, in use, to re-open when obstructed while closing, unless the closure member is between the reversing position and the fully closed position.

10 52. A method according to claim 51, wherein the closure member is caused, in use, to stop when obstructed while closing, when the closure member is between the reversing position and the fully closed position.

15 53. A method according to claim 51 or 52, wherein the reversing position is between the fully closed position and the or the corresponding speed change position.

54. A method of controlling an aperture closure member, substantially as described above, with reference to the accompanying drawings.

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55. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.